

# ASTECC



## PHANTOM

### OPERATION AND SERVICE MANUAL

ASTECC Burner Group

Version 1, 1/27/15





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## Introduction

### Operation and Service Statement

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of ASTEC Burner Systems Group equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, or variations may preclude covering every possibility. If there is any information that is unclear, contradictory, or absent from this manual, please contact ASTEC Burner Group for clarification before proceeding.

### Scope of this Manual

The objectives of this manual are to document the installation, operation, and maintenance of ASTEC Burner Systems Group equipment. It provides policies, procedures and references for assuring and controlling quality and compliance to requirements.

## Danger Safety and Warnings

### DANGER Combustion Equipment

Operating this Burner outside its design parameters, and/or removing, disabling, or bypassing any PHOENIX Phantom safety device can cause an explosion, serious injury, or death.

### Basic Safety instructions

1. Always lockout power to any plant equipment before working on it.
2. Equipment that is de-energized can still retain residual energy, or may be susceptible to gravity or other potential energy sources.
3. Keep away from power driven parts, even if they are not moving, unless they are locked out or chained down.
4. Use extreme caution if you must approach running equipment.
5. Check that all fuel sources are shut off, and locked out prior to working on the burner.
6. All the drive guards, handrails, and other safety devices must be in place before starting the equipment.
7. Prior to start up check that all plant components are in good working condition.
8. Never remove, disable, defeat, or bypass any safety device on this equipment.
9. Make no modifications to your PHOENIX Phantom Burner without the recommendation or approval of a representative of ASTEC Burner Group, Engineering, or Service Departments.
10. Account for all your personnel, on the jobsite, before plant startup.
11. Avoid wearing loose clothing, long hair, necklaces, neckties, or anything that could become entangled in rotating machinery.
12. Never leave the control house unattended, while the plant is in operation.
13. To avoid engulfment by loose aggregate, never walk on the material stockpiles, or on the material in the cold feed bins.
14. Never enter a potentially hazardous enclosed space, without an OSHA enclosed space permit program in effect. (Contact ASTEC Parts Department for an outline of these requirements.)
15. Relieve internal pressure before working on any equipment containing high pressure.
16. Carefully vent any flammable gas using safety measures that will prevent ignition.
17. Thoroughly tighten all fittings before reapplying pressure.



## How to Recognize Shock

**Shock is caused by a rapid loss of blood pressure, the symptoms include:**

- A rapid and weak pulse.
- Rapid breathing.
- A feeling of tiredness, or sleepiness.
- Confused thinking.
- Pale, cold, and sweaty skin.

**First aid for shock:**

- Have the victim lie down, and remain quiet.
- Elevate the victim's feet, to improve circulation to the head and chest.
- Cover the victim with a blanket to maintain body temperature.
- Transport the victim to a hospital, medical clinic, or doctor's office as soon as possible.

## WARNING!

**Carefully read the safety instructions in this operating and service manual. Follow all the safety warning messages located throughout this manual.**

- Always lock-out power before working on any plant equipment.
- To prevent serious bodily injury, do not operate any plant equipment with the guards or other safety components removed.
- Never repair this burner with replacement parts not approved by the manufacturer. (Approved parts are only those available through ASTEC parts department, or any other parts specifically approved by the ASTEC Burner Systems Group.)
- These instructions are intended for use only by experienced and qualified personnel. (Qualified personnel are those trained by ASTEC Burner Systems Group, or ASTEC's Service Department.)

## General Burner Information

The PHOENIX Phantom is designed to provide maximum firing capability with a minimum of noise and pollution.

With its compact flame shape, the PHOENIX Phantom provides the ideal means for drying aggregate. The flame shape is pre-set at the factory for the most efficient profile for your drum and burner configuration.

The PHOENIX Phantom is a sealed-in combustion system that provides all the necessary combustion air. This ensures that the combustion air, plus approximately 60% excess air, is available for efficient operation at maximum capacities.

The Fuel/Air ratio is maintained throughout the burner's operating range with electronically linked valves. Depending on burner configuration, the PHOENIX Phantom will burn all commercial grades of natural gas or propane. The gaseous fuels are burned as "Premix". Fuel gasses and air are premixed in the burner body, well upstream of the ignition point at the burner nose. Being a Premix Burner enables the PHOENIX Phantom to operate more cleanly and quietly.

The burner provides a nominal 7:1 turndown from its maximum firing rate, providing efficient operation at various production rates. In most cases the actual turndown available is somewhat higher (See the Individual Burner Performance sheets).



## Receiving and Inspection

Upon receipt of the Burner:

1. Check each item on the bill of lading and/or invoice to determine that all the equipment that was shipped has been received.
2. Carefully examine all of the equipment, assemblies and subassemblies to check if there has been any damage in shipment.
3. If there are any damaged or missing parts, contact ASTEC Burner Systems Group for assistance. (423-867-4210, or FAX 423-827-1560)

**NOTE:**

If the installation is delayed and the equipment is to be stored outside:

1. Provide adequate protection, as dictated by your climate and the period of exposure.
2. Special care should be given to all; motors, hydraulics, electrical parts, and bearings, to protect them from rain, snow, or excessive moisture.

## Burner Capacity

BURNER MODEL	AIR FLOW SCFH	BURNER BLOWER HP	NATURAL GAS SCFH	MAXIMUM CAPACITY BTU/HOUR
PP-50	804,800	75	50,000	50,000,000
PP-75	1,207,200	100	75,000	75,000,000
PP-100	1,609,600	125	100,000	100,000,000
PP-125	2,012,000	150	125,000	125,000,000
PP-150	2,414,400	200	150,000	150,000,000

*Table - 1 Burner Capacities*

### Notes: For Table-1

1. The maximum BTU/hour rating is based on 60% excess air.
2. The figures used in Table – 1 are based on: 60Hz AC, and Standard Cubic Feet per Hour (SCFH), at 70F air temperature, at sea level.
3. Correction factors must be applied for altitude or temperature variations. (See Altitude Correction Chart.)
4. The system exhaust fan must have enough capacity to provide a slight negative pressure (0.20" to 0.30" water column) at the burner breech plate. (This will exhaust the products of combustion, and prevent "puffing" at the breeching plate.)
5. The air flow in the PHOENIX Phantom can be monitored using the pressure tap on the side of the burner blower housing. (The air pressure for a given flow is in the individual burner capacity tables.)
6. The values of differential pressure versus flow are listed in the individual burner capacity sheets.
7. The gas flow in the PHOENIX Phantom can be measured using an orifice plate if the flow meter readings are suspect.



## Combustion Flighting

1. The flight design in the combustion zone of the drum is especially important for minimizing flue gas pollutant emissions.
2. The flights provide heat shielding to keep the drum skin temperature low. (Protecting the metal drum skin from the flame radiating directly onto the drum.)
3. For the lowest possible emissions of CO and Total Hydrocarbons, the combustion zone must be clear of veiling material. (Showering material through the flame is a common cause of incomplete combustion.)
4. The combustion zone must be large enough to accommodate complete combustion. (The length and diameter of the combustion zone must be large enough for the burner flame to fit inside. See the Burner Performance Data Sheets for the flame dimensions.)
5. The combustion flights are designed to be self-cooling, to prevent their failure through overheating. (A good combustion flight design plows most of the material over the flights, while allowing some to flow under them next to the shell, insulating the drum from radiant heat, and using the aggregate to cool the flights.)
6. The ASTEC Parts Department can supply combustion flights designed for your application.

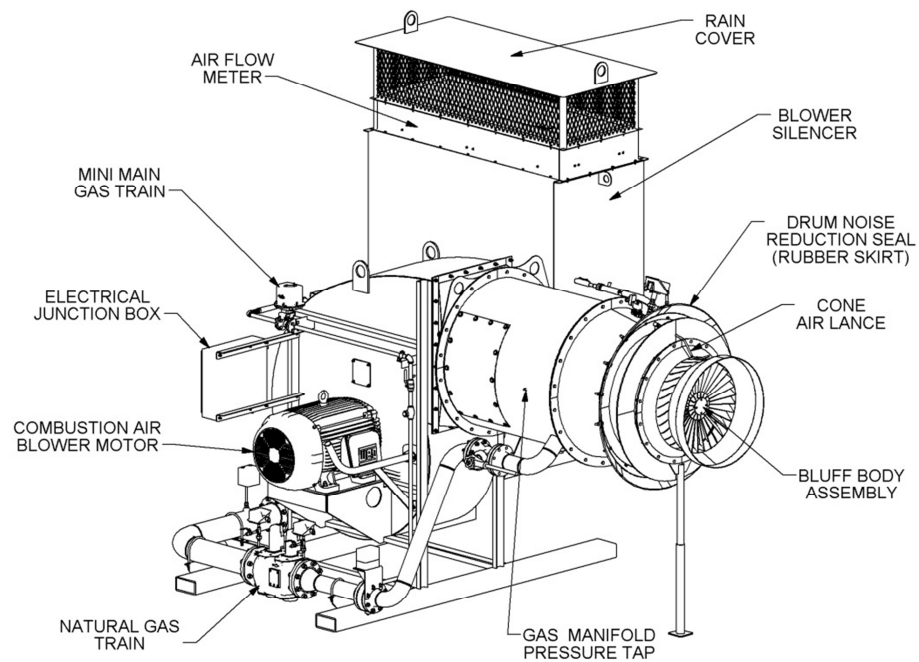
## Operation

1. The PHOENIX Phantom utilizes a variable frequency drive (VFD) to control the combustion air blower.
2. The fuel valve(s) have independent control motors, or actuators. (There is no mechanical linkage between the fuel and air controls.)
3. A programmable logic controller (PLC), or other ratio control system approved by ASTEC Burner Systems Group, controls the air and fuel flows independently.
4. The combustion air blower pressure switch (normally open) must be made to prove the blower is operating. (This pressure switch is usually set at 0.2" W.C. It will close as the air pressure exceeds the set point.)

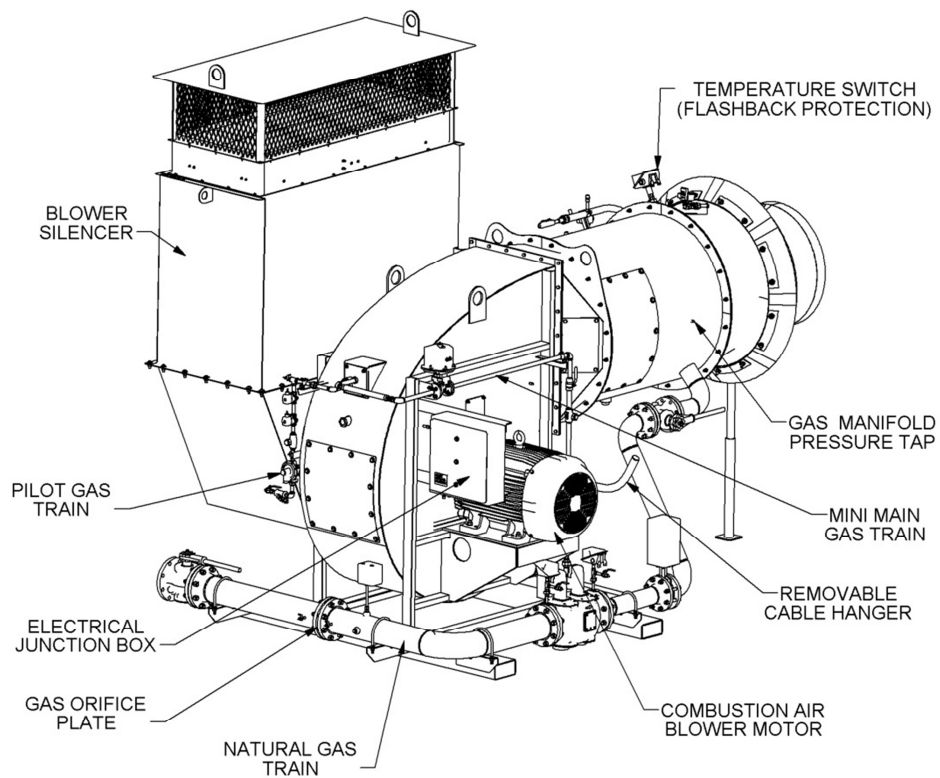
**Note:**

When the blower first comes on it will be turning slowly (about 240 RPM). This is a normal operating condition.

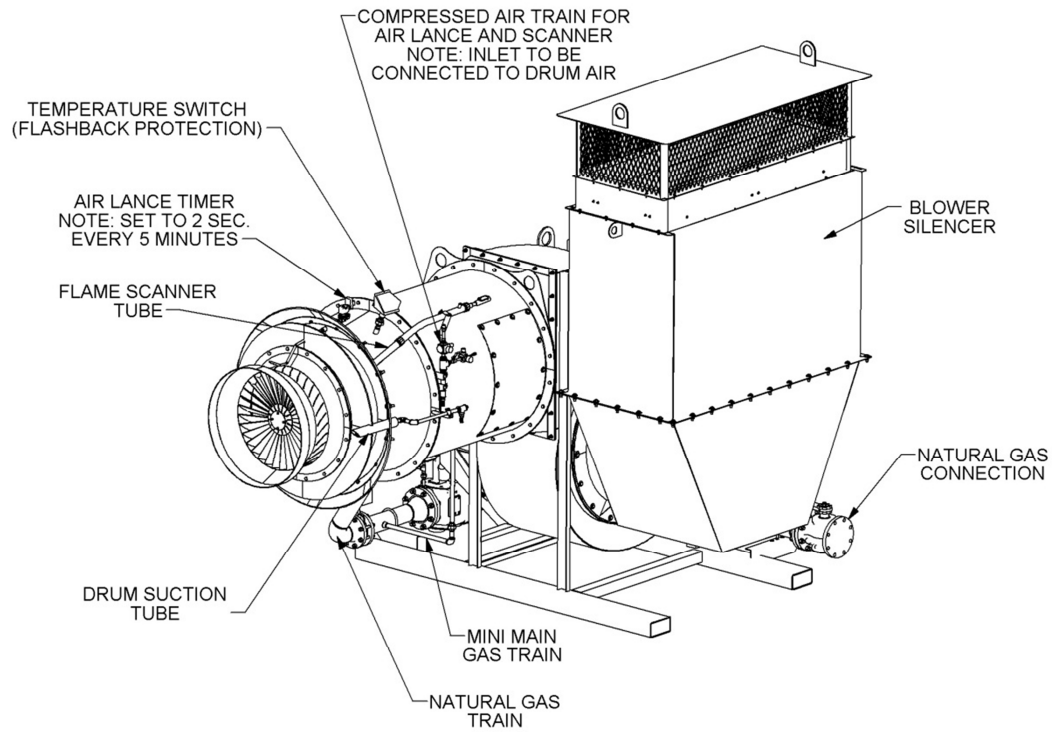
5. The combustion air blower will adjust to high speed automatically.
6. These conditions must be met to initiate the purge cycle prior to lighting the burner.
  - a. The safety limit parameters must be satisfied.
  - b. The purge pressure switch (normally open) must be energized for the purge cycle to begin. (This pressure switch is usually set at 10" W.C. It will close when the air pressure exceeds the set close point.)
  - c. The plant flue gas exhaust fan must be confirmed to be running.
  - d. The purge timer must be set so that a minimum calculated volume of air flows through the drum during the purge cycle. (The minimum purge time is the time required for this calculated volume of air to flow through the heating chamber. This is usually 4 times the chamber volume.)
7. Before light-off, the combustion air blower must be set at the low-fire speed.
8. The low-fire combustion air pressure switch (normally closed) must make to prove that the blower is at the low fire speed. (This switch is usually set at about 1-1/2" W.C. It will make as the air pressure falls below the set point.)
9. For the light-off sequence to begin, the fuel valve(s) low fire switch must be made, to prove that the fuel valve(s) are at the low fire position.



*Illustration 1*



*Illustration 2*



*Illustration 3*



## Adjustments

### WARNING!

Because all combustion systems are inherently dangerous only qualified and experienced personnel should attempt to start-up and adjust PHOENIX burner systems.

Qualified personnel are defined as those trained by the ASTEC Burner Systems Group, or ASTEC Service Department.

Experienced personnel are defined as those who have previously fired an ASTEC Phoenix Burner, under the supervision of the ASTEC Burner Systems Group, or ASTEC Service Department.

### NOTE:

The fuel valves, fuel profile and air profile are pre-set at the factory to simplify burner and process set-up. However, some adjustment will be required for operation.

1. See the complete Burner Performance Data Sheets for flows, operating pressures, and valve positions. Data sheets are located inside the burner junction box. If data sheets are missing contact ASTC Burner Group for a copy.
2. Set the fuel pressure at the entrance of the burner fuel train at the pressure listed on the Burner Performance Data Sheet.
3. Check the flue gas readings for O<sub>2</sub> and CO.
  - a. On a DOUBLE BARREL™ drum where there are minimal amounts of air leaking into the exhaust system, a typical O<sub>2</sub> level in the exhaust stack is 10.5 % at high fire.
  - b. The amount of CO should be less than 500 PPM referenced to 3% O<sub>2</sub>.
  - c. Higher CO can be caused by having either too much or too little combustion air (or a problem with the combustion zone lighting).
4. Altering the fuel / air ratio of the burner requires care and expertise to prevent a dangerously rich condition.
5. The best way to alter the fuel / air ratio is to alter either the air or fuel profile within the burner control system.
6. A less preferred alternative is to vary the fuel pressure slightly.
7. Record any changes prior to running and retain for your records.
8. The spin vanes affect both flame shape and fuel mixing.
  - a. The spin vanes are preset at the factory, and are optimized for most situations.
  - b. The spin vanes are not designed to be field adjustable.

### NOTE:

Take the flue gas measurements, during the adjustment process, to verify complete combustion.

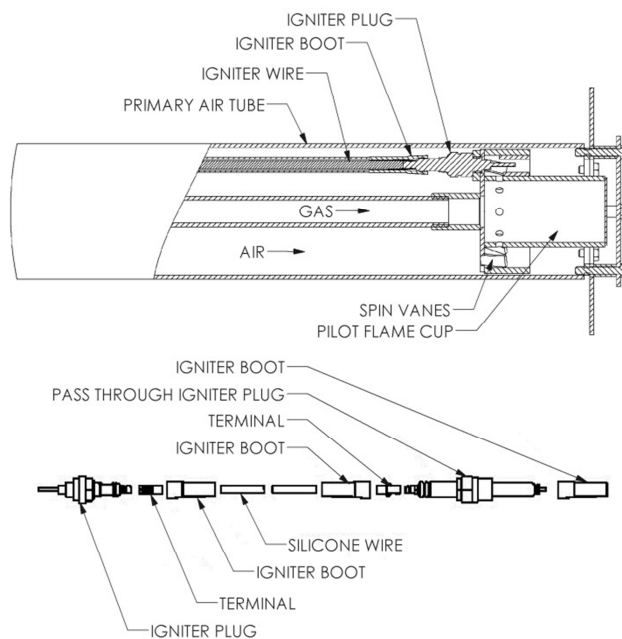


## Burner Mounting

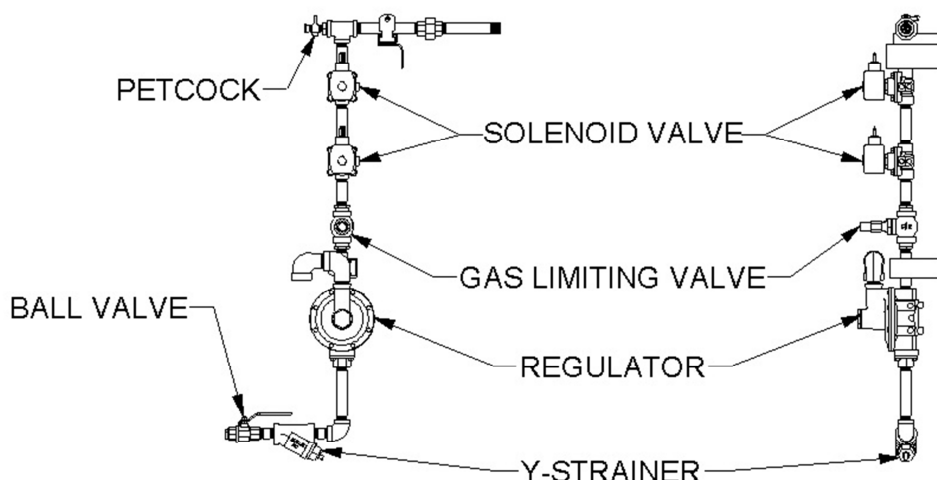
1. The centerline of the Burner should be mounted on the centerline of the drum, at the same pitch as the drum.
2. Refer to the drawings located in burner junction panel for burner weight and dimensions.
3. For stationary breeching plates (i.e. not Double Barrel Drums) the burner comes with a split mounting flange that can be bolted onto the drum breeching plate and welded to the burner nose.
4. The mounting flange allows the positioning of the burner at the correct insertion depth past the breeching plate.
5. The insertion depth should be determined by the ASTEC Engineering Department at the time the order is placed.
6. Cut out a hole in the breeching plate 2" larger in diameter than the burner nose flange.
7. Check burner blower rotation. Rotation should be clockwise from the motor end.

## Burner Pilot System

The PHOENIX Phantom incorporates a forced-air pilot system. The Pilot and the main flame are monitored by a single Ultra Violet (UV) flame detector attached to the burner. The air for the pilot is provided from the burner blower, where there is positive air pressure. The adjustment and operation of the pilot system is detailed below.



*Illustration 4 - Pilot System*



*Illustration 5 – Typical Pilot Gas Train*

## Adjustment and Operation of the Pilot System

1. Use Natural Gas (NG) or Liquid Propane (LP) vapor only to fuel the pilot.

### **WARNING!**

Never connect the LP fuel line to the pilot from the bottom of the LP tank. LP would likely be sent to the pilot, where it could quickly boil off, causing either an explosion or fire in the burner.

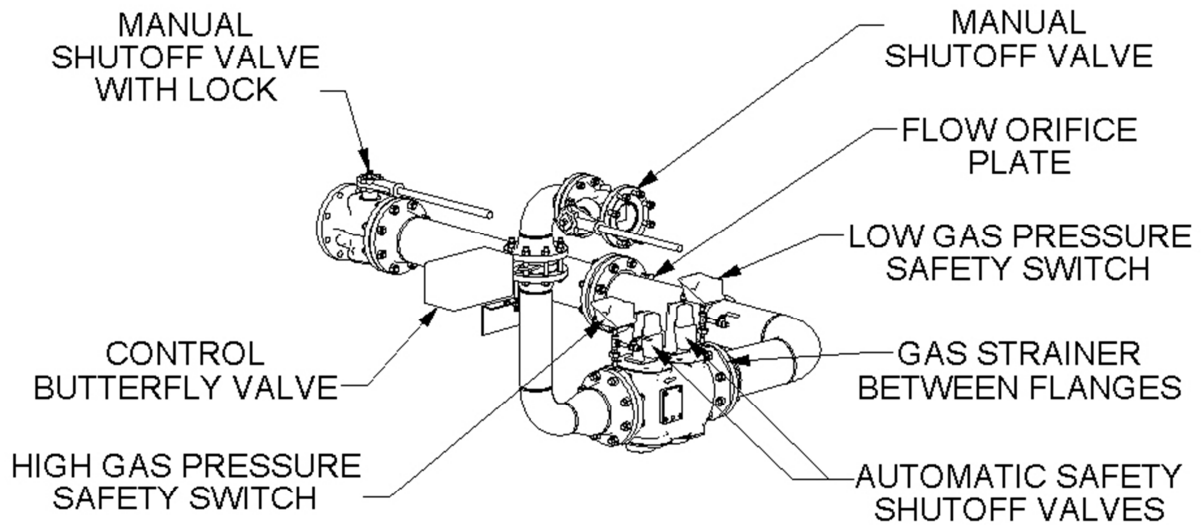
2. If natural gas is the primary fuel, the pilot fuel supply should be connected to the natural gas feed piping, upstream of the main regulator.
3. If you will be firing using liquid fuels, and/or natural gas service is not currently available, connect the gas feed piping to a LP vapor line. (See above warning.)
4. Purge the fuel piping of any contaminants before connecting it to the pilot assembly.
5. Size the pilot gas supply line to avoid an excessive pressure drop. (For a pilot gas supply line up to 50 feet long, use a minimum of 3/8" pipe.)
6. Gas pressures at the inlet of the gas pilot manifold can range from 2 to 25 psig.
7. The entire pilot/oil gun assembly can be removed from the burner by removing the bolts on flange at the back of the burner, then pulling the assembly backwards.
8. Remove the spark plug wire boot, then the spark plug can be removed with a standard spark plug socket.

## The Initial Pilot Adjustment

1. Make sure the spark igniter is connected to the ignition transformer.
2. The initial recommended pressure setting is approximately 5" water column for vaporized propane, 10" water column for natural gas (at the test port).
3. At this rate the pilot should light the main burner easily, and deliver a sufficient UV flame signal.



## Natural Gas Fuel Piping System



*Illustration 6 - Gas Train Components*

1. Install a controlling gas regulator in the main gas line within 25 feet of the burner.
  - a. This regulator should be sized to provide the required gas flow at the inlet of the burner manifold.
  - b. See the burner performance data sheet for the nominal expected gas pressure required at the burner.
  - c. Exact gas pressure must be set at the initial start-up depending on piping configuration, burner size, and maximum capacity desired.
2. The piping from the gas regulator outlet to the burner gas manifold should be sized to minimize pressure losses.
3. The pipe size from the control regulator to the gas train, can be identical to the gas pipe size at the entrance to the burner gas train, see tables below.

**NOTE:**

It is normal for the regulator size to be smaller than the line size.

**NOTE:**

If the Gas run is more than 25', use the connection size on the burner shown in Table-2 below.

FEED PIPE SIZE, FOR GAS RUNS OVER 25 FEET					
Burner Model	PP-50	PP-75	PP-100	PP-125	PP-150
Pipe Size (Minimum Dia.)	4"	6"	6"	6"	8"

*Table 2 - Feed Pipe Size, for Gas Runs Over 25 Feet*

**NOTE:**

If the Gas run is 25 feet or less. use the connection size on the burner shown in Table-3 below.

FEED PIPE SIZE, FOR GAS RUNS 25 FEET OR UNDER					
Burner Model	PP-50	PP-75	PP-100	PP-125	PP-150
Pipe Size (Minimum Dia.)	4"	4"	4"	6"	6"

*Table 3 - Feed Pipe Size, for Gas Runs 25 Feet or Under*

4. The supplied manual shutoff valve, must be installed upstream of the gas control regulator.
  - a. The strainer protects the valves from destructive dirt that could lodge in them.
  - b. This shutoff valve facilitates servicing of the gas control train.
  - c. The Siemens gas valves have an integral strainer at the inlet of the valve.
5. The gas company should purge the main gas line for scale and dirt before it is attached to the burner gas manifold.

**NOTE:**

Install the flexible fitting supplied with the burner gas manifold to reduce flexing of the manifold produced by plant vibrations.

ASTEC PART NUMBERS, FLEXIBLE PIPE NIPPLES					
Burner Model	PP-50	PP-75	PP-100	PP-125	PP-150
ASTEC Part Number	076046	048292	048292	048292	048292

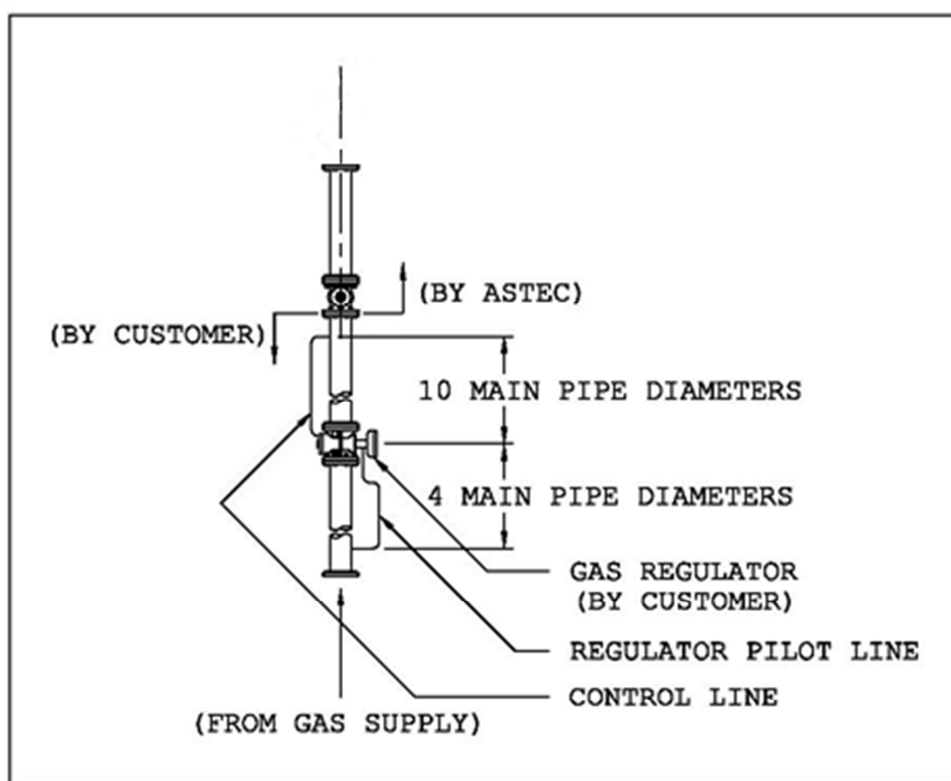
*Table 4 - Recommended Pipe Nipple*

**NOTE:**

The low and high gas pressure switches should be set just above and below the safe operating range of gas inlet pressures respectively. This should be individually determined on each installation. Typically this would be 50% of the running pressure for the low gas pressure switch and 125% of the operating pressure for the high gas pressure switch.

NATURAL GAS REGULATOR REQUIREMENTS					
Burner Model	PP-50	PP-75	PP-100	PP-125	PP-150
Maximum Capacity	50,000 Cu Ft/Hr	75,000 Cu Ft/Hr	100,000 Cu Ft/Hr	125,000 Cu Ft/Hr	150,000 Cu Ft/Hr
Gas Inlet Pipe Size	4"	6"	6"	6"	8"

*Table 5 - Natural Gas Regulators*



*Illustration 7 - Regulator Requirements*

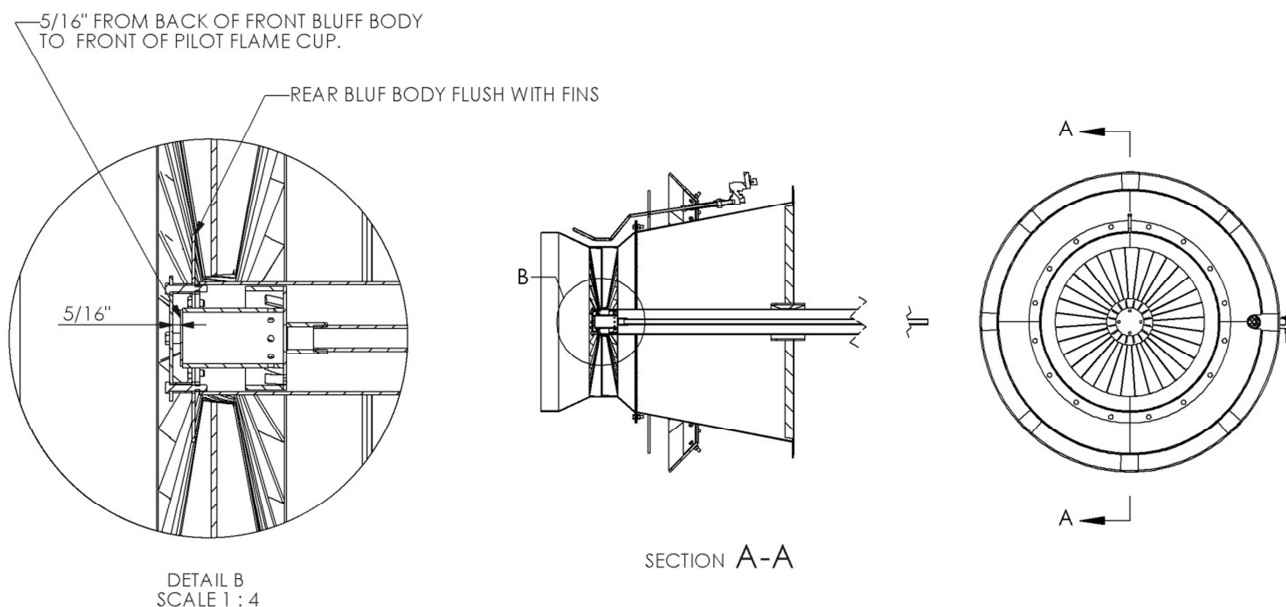
6. The gas valve is close coupled to its actuator, eliminating all linkages
7. See individual burner performance sheets for air and gas flows. (See Detailed Burner Performance Sheets)
8. Use the utmost care in making any adjustment to prevent an unsafe condition.

**WARNING!**

- Final settings will have to be adjusted for the particular operating conditions.
- Be sure not to have more fuel flow than there is combustion air available to burn, or "puffing", and a dangerously rich firing condition could occur.



## Pilot Gun Assembly



*Illustration 10 - Pilot Nozzle*

The position of the pilot gun affects scanner flame strength and light off of the main flame. The gun assembly is preset at the factory as shown in Illustration - 10.

### To Reset the Nozzle Position, use the following steps:

1. Shut down the burner.

#### **WARNING:**

Lock-out the plant power, before working on the burner.

2. Look at Illustration-10 to determine if the pilot gun assembly must be moved in or out to regain the proper adjustment.
3. Loosen the set screws of the set collars on the mounting plate of the pilot gun assembly.
4. Move the nozzle pipes in or out to effect the required retraction or extension of the pilot gun assembly.
5. Once the proper positioning of the pilot gun assembly is completed re-tighten the set screws of the set collars on the mounting plate of the pilot gun assembly.



### To Remove the Gun Assembly, use the following steps:

1. Shut down the burner, and de-energize the burner compressed air system.

**WARNING:**

Lock-out the plant power, before working on the burner.

2. Remove the four nuts holding the pilot gun assembly onto the burner/blower.
3. Pull out the pilot gun assembly from the burner/blower body.
4. Make a note of the initial position of the gun by paint marking the pipe.
5. Once the proper positioning of the pilot gun assembly is completed:
  - a. Re-tighten the set screws of the set collars on the mounting plate of the pilot gun assembly.
  - b. Install the pilot gun assembly in the burner/blower with the four bolts.

## Flame Shape Adjustments

1. The PHOENIX PHANTOM Burner is preset at the factory for the shortest and narrowest flame possible. This makes flame adjustment burners virtually obsolete.
2. The nose spin vanes affect the flame shape and combustion intensity.
3. Do not change the spin vanes from the factory settings. (They are preset at 45° to 60°.)
4. The length of the flame must be shorter than the combustion zone in your drum. (Material that showers through the flame causes increased pollutants in the flue gas.)
5. The width of the flame must be less than the I.D. of the combustion flights.
6. See the detailed Burner Performance Data Sheets for the flame size and diameter. (See Burner Performance Data Sheets.)

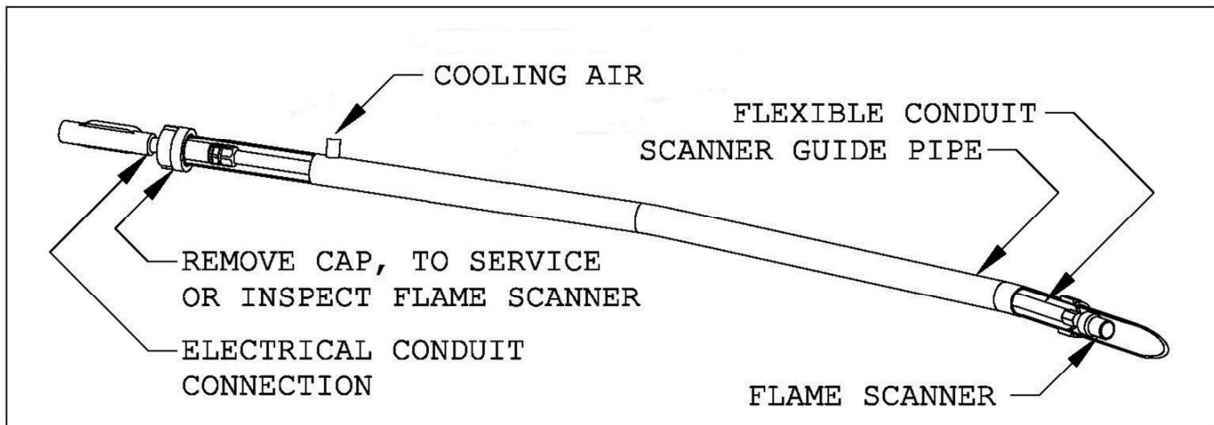


## Flame Scanner

The PHOENIX PHANTOM is supplied with a Flame Scanner that detects Ultra Violet (UV) in the flame. The flame scanner is located in an air cooled guide tube near the front of the burner. It can be removed by unthreading the 1 ¼" aluminum cap on the back of the burner and pulling the flexible conduit attached to it out.

**NOTE:**

Be careful not to physically shock or overheat the Flame Detector as this can cause it to fail.



*Illustration 12 – Flame Scanner*

## Scanner Cooling Air

The flame scanner requires cooling air at a constant pressure from the plant compressed air supply to prevent dust buildup in front of the scanner lens. Dust buildup on the scanner lens will degrade accurate flame readings and may cause nuisance shutdowns.



## Maintenance & Trouble Shooting Guide

The PHOENIX Phantom burner has minimal internal moving parts and is relatively maintenance free, however there are a few items that for safety reasons and for fuel efficiency should be periodically checked.

### Maintenance Schedule

#### Daily Maintenance

- Clean all strainers as needed.
- Check fuel pressure.

#### Weekly Maintenance

- Clean the flame scanner using a soft cloth and Windex.

#### Monthly Maintenance

- Remove the gun assembly from the back of the burner.
- Clean the swirl plate, attached to the back of the nozzle body.
- Clean and inspect the igniter plug and igniter wire.
- Inspect the burner cone for signs of distortion, or other heat damage.

#### Yearly Maintenance

- Thoroughly wash and inspect the burner blower impeller. It is accessed through the hatch on the back of the blower.
- Clean the pilot gas Y-strainer.
- Clean the gas Y-strainer. It is located at the inlet of the double blocking gas valve.
- Check fuel piping for leaks and tightness.
- Have combustion quality checked with a combustion analyzer.
- Check the function of all safety equipment (pressure switches, limit switches, etc), to make sure they are all fully operational.

#### Maintenance Notes:

1. To remove and clean the pilot gun assembly use the procedure from page 17.
2. Check to make sure the pilot gun assembly is at the proper position inside the burner. (See *Illustration 10*)
3. Periodically check the functioning of all safety equipment (pressure switches, limit switches, and solenoids) to make sure they are not clogged with dirt, or in any way inoperative.
4. Frequently, a weak flame signal is caused by dust on the lens of the flame scanner.



## Trouble Shooting

Trouble Shooting		
Problem	Cause	Solution
Pilot will not light	No Spark	<ul style="list-style-type: none"><li>a. Check to see if the plug has a spark.</li><li>b. If there is no spark, check the Plug, Cable, and Ignition Transformer.</li><li>c. Check to see if voltage is going to the Ignition Transformer.</li><li>d. Check the terminal connection to the Ignition Transformer.</li><li>e. Check the connection at the back of the Burner.</li><li>f. Check the connection at the J-Box.</li><li>g. Remove the Pilot Gun Assembly; and check the connection to the Plug.</li><li>h. Inspect the Spark Plug Cable for tears and cuts.</li><li>i. Check the Spark Plug for carbon build-up.</li><li>j. Check the Spark Plug Gap.</li></ul>
	No Pilot Gas	<ul style="list-style-type: none"><li>a. Check the LP Tank for fuel level.</li><li>b. Check the Cut-Off Valve position.</li><li>c. Check for LP gas leakage.</li><li>d. Check the LP fuel pressure.</li><li>e. Verify the Pilot Solenoids are opening. and that there is gas flow.</li><li>f. Check the Pilot Strainer for dirt.</li></ul>
	No Flame Signal	<ul style="list-style-type: none"><li>a. Verify the Pilot Solenoids are opening, and that there is gas flow. See "No Pilot Gas" above.</li><li>b. Pull the Flame Sensor from the Burner, and clean the lens.</li><li>c. Check the signal from the Flame Sensor; if there is no signal, replace the Flame Scanner.</li><li>d. If the Pilot is lighting and there is no Flame Signal, replace the Flame Scanner.</li><li>e. Check the wires to the Flame Relay.</li><li>f. Then check the Flame Relay, fix or replace as needed.</li></ul>
Main Burner Fuel won't ignite	Fuel flow too low	<ul style="list-style-type: none"><li>a. Check the fuel pressure, as it may have changed.</li><li>b. Check the burner set-up sheets for standard settings.</li><li>c. Check/clean the gas strainer at the inlet of the Siemens gas valve.</li></ul> <p>NOTE: Be careful when increasing the fuel flow not to make the mixture too rich, or the low fire setting could be too high.</p> <ul style="list-style-type: none"><li>i This adjustment could be done by qualified personnel.</li><li>ii Qualified personnel are those trained by ASTEC Service Department.</li></ul>



Trouble Shooting, Continued:		
Problem	Cause	Solution
Limits not complete	Pressure switch, or limit switch not energized	a. See the component location drawings for Pressure and Limit Switch location. b. Check the Fuel Pressure Switch. i. Is it energized if not repair or replace it. ii. Is it plugged, if it is clean replace it, c. Check the Limit Switch.
High stack temperature	Too much fuel at low fire	a. Check the fuel flow at low fire, set to recommended flow. b. Check the fuel pressure, set to recommended pressure.
	Incorrect fighting in the drum	Contact the ASTEC Service, or Engineering Departments, to have ASTEC personnel check the flights.



## Recommended Spare Parts

PHOENIX PHANTOM SPARE PARTS LIST			
Item	Quantity	ASTEC P/N	Description
1	1	000346	Pressure Switch, High Fire
2	1	014655	Pressure Switch, Low Fire
3	1	071195	Ignition Transformer
4	1	074187	Regulator 1/2" 1-2.2 psi
5	18FT	071710	Red Silicon Wire
6	2	071712	Terminal
7	2	071713	Boot, Terminal
8	1	071187	1/2" Y-Strainer
9	1	077241	Temperature Switch, 400°F
10	1	075050	Igniter
11	1	075069	Pressure Switch, Low Combustion Air
12	1	063336	Fireeye UV Scanner
13	1	075703	1/4" Pressure Switch, 100 PSI
14	2	081185	Pilot Solenoid Valve 1/2"
15			

*Table 9 – Spare Parts List*

**Parts Hotline 1-800-251-6042**

Hours: Monday thru Friday 7:00 a.m. to 12:00 a.m. midnight, EST

Saturday 8:00 a.m. to Noon EST

Telephone: 423-867-4210 | Fax: 423-867-7609



## Detailed Burner Performance Sheets

The burner performance data sheet(s) are located on the door of the burner junction panel in a clear tube. Other items that should be found inside the junction panel are:

1. The burner general arrangement which will have the dimensions and overall weight of the burner.
2. The burner specification plaque. It will have the maximum firing rate, fuel pressures, and flow rates listed.
3. The piping and instrumentation (P & I) drawing is a representation of all the piping and electrical components on the burner. The components which are tagged, for example PI 1-1, will have the Astec part number listed with it. The tags on the components match the P & I drawing. This will allow you to call the Astec Parts Department and obtain an identical part.

**If you cannot locate or are missing any of these documents please contact the Astec burner group to obtain a replacement.**

**Note:**

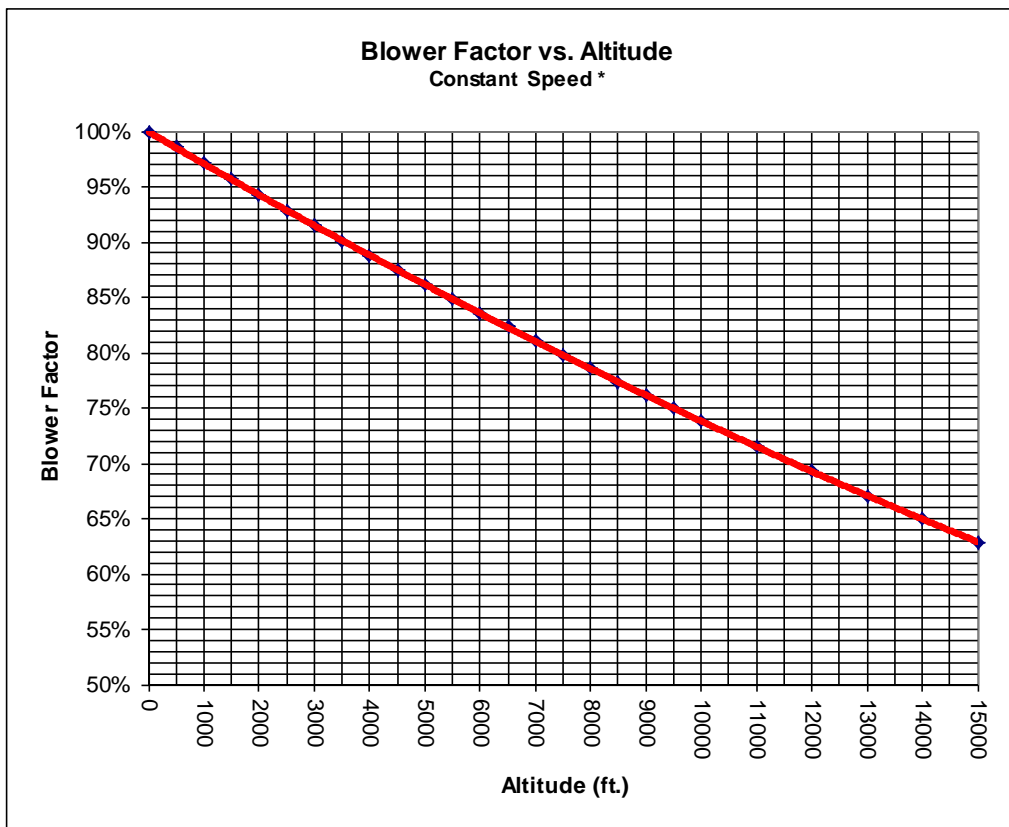
- Should further information be required, or answers to questions not covered generally, or should particular problems arise which are not covered in this manual, contact the Astec Service Department, or the Astec Burner Systems Group
- Whenever any replacement parts are needed, call Astec Parts Department, any time day or night at 1-800-251-6042



## Altitude Correction Chart

### Blowers at Constant Speed \*

Altitude Above Sea Level (ft.)	Air Density lb./ft <sup>3</sup>	Blower Correction Factor
0	0.077	100%
500	0.075	99%
1000	0.074	97%
1500	0.073	96%
2000	0.072	94%
2500	0.071	93%
3000	0.070	92%
3500	0.069	90%
4000	0.068	89%
4500	0.067	87%
5000	0.066	86%
5500	0.065	85%
6000	0.064	84%
6500	0.063	82%
7000	0.062	81%
7500	0.061	80%
8000	0.060	79%
8500	0.059	77%
9000	0.058	76%
9500	0.057	75%
10000	0.057	74%
11000	0.055	72%
12000	0.053	69%
13000	0.051	67%
14000	0.050	65%
15000	0.048	63%



For constant speed blowers, blower capacity, power usage and blower pressure are all related linearly to the density of air. To find a burner's performance at altitude, multiply the desired property as determined at sea level by the blower correction factor.

The Phoenix burners uses a variable speed drive. This allows it to have its speed raised to compensate for the lower air density.

For example: A blower using 75 HP at sea level would use  $75 \times 0.86 = 64.5$  HP at 5000 ft. Likewise if the blower capacity had been 1,000,000 SCFH at sea level it would be reduced to  $1,000,000 \times 0.86 = 860,000$  SCFH at 5000 ft. Additionally if the fan had a static pressure reading of 10 in. H<sub>2</sub>O at sea level would be reduced to  $10 \times 0.86 = 8.6$  in H<sub>2</sub>O at 5000 ft. To compensate for this lower density, the fan speed must be raised above what is listed on the burner profile to obtain the desired static pressure (10 in H<sub>2</sub>O) and HP (75). Do not exceed the maximum motor speed or the maximum blower speed, whichever is lower. If you have any questions please contact the burner group for assistance at 423-867-4210.